AMENDMENTS TO THE CLAIMS

The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Previously Presented) A contaminant molecule sensor configured for use in a vacuum environment, the sensor comprising:

an electrochemical cell comprising

a measurement electrode comprising a catalyst selected for its ability to catalyze the dissociation of a contaminant molecule into its ionic species;

a reference electrode comprising a catalyst selected for its ability to catalyze the dissociation of a reference molecule into its ionic species; and

a solid-state ionic species conductor bridging the measurement electrode and the reference electrode, the conductor being selected to conduct an ionic species common to the dissociated contaminant and reference molecules; and

means for initiating catalysis of the dissociation of the reference and contaminant molecules.

2. (Previously Presented) The sensor according to claim 1, wherein the means for initiating the catalysis of the dissociation of the reference and contaminant molecules

comprises means for controlling and monitoring the temperature of the cell.

3. (Previously Presented) The sensor according to claim 2, comprising means for separating a reference environment space from a monitored environment space, the means for controlling and monitoring the temperature of the cell including a heating device contained within the reference environment space.

4. (Previously Presented) The sensor according to claim 2, wherein the means for controlling and monitoring the temperature includes an electrically powered heater.

5. (Currently Amended) The sensor according to claim 4, wherein the electrically powered heater comprises ~~nichrome~~ wire.

6. (Currently Amended) The sensor according to ~~any of~~ claims 2, wherein the means for controlling and monitoring the temperature includes a temperature sensor.

7. (Previously Presented) The sensor according to claim 6, wherein the temperature sensor is a thermocouple.

8. (Previously Presented) The sensor according to claim 1, comprising a vacuum feed-through connection for providing an electrical connection to the measurement electrode.

9. (Previously Presented) The sensor according to claim 1, comprising seals for

connection to a vacuum environment.

10. (Previously Presented) The sensor according to claim 1, wherein a reference environment space is at least partly bounded by the reference electrode and is open to the ambient atmosphere.

11. (Previously Presented) The sensor according to claims 1, wherein a reference environment space is at least partly bounded by the reference electrode and is enclosed by a seal.

12. (Previously Presented) The sensor according to claim 11, wherein electrical cables for connecting the electrodes and optionally an electric heating means with an electrical circuit external to the reference environment space pass through the seal.

13. (Previously Presented) The sensor according to claim 11, comprising, in the reference environment space, a solid-state source of the reference molecules.

14. (Previously Presented) The sensor according to claim 13, wherein the ionic species to be conducted is H^+ and the solid-state source is selected from a metal, a metal/hydride, a metal alloy/metal-hydride, any hydrated species, and any organic species.

15. (Previously Presented) The sensor according to claim 13, wherein the ionic species to be conducted is O^{2-} and the solid-state source is selected from a metal, a metal alloy and a

metal oxide.

16. (Previously Presented) The sensor according to claim 15, wherein the metal is copper (Cu) and the oxide is Cu_2O.

17. (Previously Presented) The sensor according to claim 15, wherein the metal is chromium (Cr) and the oxide is Cr_2O_3.

18. (Previously Presented) The sensor according to claim 15, wherein the metal is nickel (Ni) and the oxide is NiO.

19. (Previously Presented) The sensor according to claim 13, wherein the ionic species to be conducted is Ag^+ and the solid-state source is a silver salt.

20. (Previously Presented) The sensor according to claim 19, wherein the solid state source is silver chloride.

21. (Previously Presented) The sensor according to claim 11, comprising, in the reference environment space, a liquid state source of the ionic species.

22. (Previously Presented) The sensor according to claim 21, wherein the ionic species to be conducted is H^+ and the source comprises a liquid acid.

23. (Previously Presented) The sensor according to claim 21, wherein the ionic species to be conducted is H^+ and the source comprises an organic liquid.

24. (Previously Presented) The sensor according to claim 11, comprising, in the reference environment space, a gaseous state source of the ionic species.

25. (Previously Presented) The sensor according to claim 1, wherein the solid-state ionic species conductor conducts H^+.

26. (Currently Amended) The sensor according to claim 25, wherein the solid-state ionic species conductor is selected from $CaZr_{0.9}In_{0.1}O_{3-x}$, $BaZr_{0.9}Y_{0.1}O_{3-x}$, $Ba_3Ca_{1.18}Nb_{1.82}O_{9-x}$, $SrCe_{0.95}Yb_{0.05}O_{2.975}$ organic membranes, inorganic membranes, and polymer membranes~~,~~ ~~Nafion™ and Nasicon™~~.

27. (Previously Presented) The sensor according to claims 1, wherein the solid-state ionic species conductor conducts O^{2-} ions.

28. (Currently Amended) The sensor according to claim 27, wherein the solid-state ionic species conductor comprises Yttria Stabilized Zirconia (YSZ).

29. (Previously Presented) The sensor according to claim 1, wherein the solid-state ionic species conductor conducts Ag^+.

30. (Previously Presented) The sensor according to claim 29, wherein the solid-state ionic species conductor comprises a silver salt.

31. (Previously Presented) The sensor according to claim 30, wherein the solid-state ionic species conductor is silver chloride.

32. (Previously Presented) The sensor according to claim 1, wherein the catalyst for the measurement electrode is the same as the catalyst for the reference electrode.

33. (Previously Presented) The sensor according to claim 1, wherein at least one of the catalysts comprises platinum.

34. (Previously Presented) The sensor according to claim 1, wherein at least one of the catalysts comprises ruthenium.

35. (Previously Presented) The sensor according to claim 1, wherein at least one of the catalysts comprises gold.

36. (Previously Presented) The sensor according to claim 1, wherein at least one of the catalysts comprises a catalyzing oxide.

37. (Previously Presented) The sensor according to claim 1, wherein at least one of the catalysts comprises a silver salt.

38. (Previously Presented) The sensor according to claim 1, comprising means for monitoring a parameter of an electrical current produced in the cell, and means for calculating from the monitored parameter the partial pressure of the contaminant molecule in an environment on a side of the cell bounded by the measurement electrode relative to that on a side of the cell bounded by the reference electrode.

39. (Previously Presented) The sensor according to claim 38, wherein the monitoring means comprises an emf measuring device electrically connected to the reference and measuring electrodes.

40. (Previously Presented) A method of detecting or monitoring the presence of a contaminant molecule in a monitored environment, the method comprising the steps of:

providing an electrochemical cell comprising

a measurement electrode comprising a catalyst selected for its ability to catalyze the dissociation of a contaminant molecule into its ionic species;

a reference electrode comprising a catalyst selected for its ability to catalyze the dissociation of a reference molecule into its ionic species; and

a solid-state ionic species conductor bridging the measurement electrode and the reference electrode, the conductor being selected to

conduct an ionic species common to the dissociated contaminant and reference molecules;

providing, on a side of the cell bounded by the reference electrode, a source of the reference molecules;

initiating the catalysis of the reference and contaminant molecules;

monitoring a parameter of an electrical current produced in the cell; and

calculating, from the monitored parameter, the partial pressure of the contaminant molecule in an environment on the side of the cell bounded by the measurement electrode relative to that on the side of the cell bounded by the reference electrode.

41. (Previously Presented) The method according to claim 40, wherein the monitored parameter is electromotive force.

42. (Previously Presented) The method according to claim 40, wherein catalysis of the contaminant molecule is initiated by heating the cell.

43. (Previously Presented) The method according to claim 40, wherein the reference molecule is the same as the contaminant molecule.

44. (Previously Presented) The method according to claim 40, wherein the catalyst for the measurement electrode is the same as the catalyst for the reference electrode.

45. (Canceled)